Montana Comprehensive Assessment System (MontCAS, Phase 2)

Criterion-Referenced Test (CRT)

COMMON CONSTRUCTED-RESPONSE ITEM RELEASE
SCIENCE, GRADE 10

2009

OPI

OFFICE OF PUBLIC INSTRUCTION

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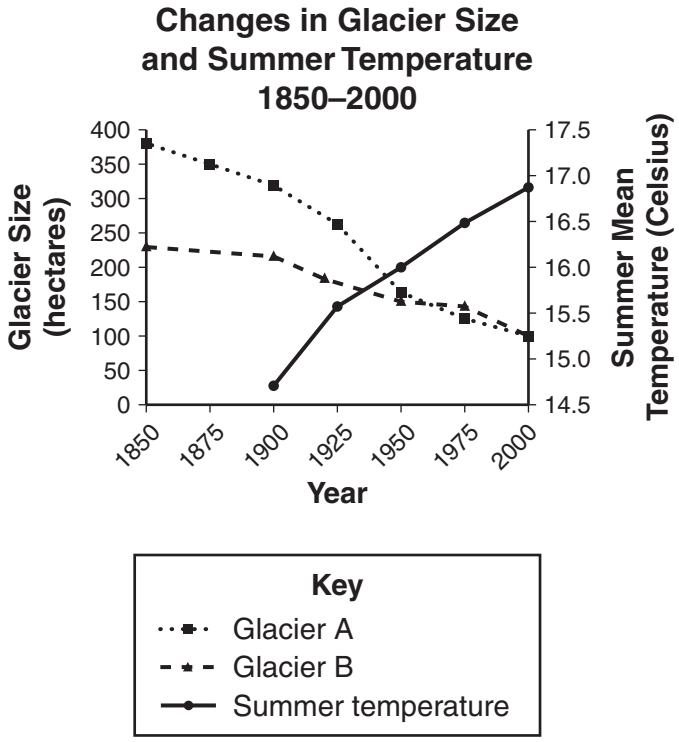
Science
Session 1

Write your answer in the space provided for it in your Student Response Booklet.

27. The graph below shows the sizes of two different glaciers in Glacier National Park, Montana, from 1850 to 2000, and the summer mean temperature for the past century.



The changes in these two glaciers reflect what is happening to most of the glaciers in the park.

a. Describe how the summer mean temperatures have changed in the past century according to the graph.

b. Explain how the sizes of the two glaciers have changed over the past 150 years.

c. Describe **two** ways the trends shown in the graph could affect weather in this area of Montana.

Scoring Guide

Score	Description
4	Response demonstrates a thorough understanding of collecting and analyzing local and regional weather data to make inferences and predictions about weather patterns; explains factors influencing global weather patterns and climate; and describes the impact on Earth of fluctuations in weather and climate. Response describes the summer mean temperature as increasing, the glacier size as decreasing, and predicts two ways that the weather might be affected by these trends. Response contains no errors or omissions.
3	Response demonstrates a general understanding of collecting and analyzing local and regional weather data to make inferences and predictions about weather patterns; explains factors influencing global weather patterns and climate; and describes the impact on Earth of fluctuations in weather and climate. Response is correct for three of the four possible answers. Response contains one error or omission.
2	Response demonstrates a limited understanding of collecting and analyzing local and regional weather data to make inferences and predictions about weather patterns; explains factors influencing global weather patterns and climate; and describes the impact on Earth of fluctuations in weather and climate. Response is correct for two of the four possible answers. Response contains two errors or omissions.
1	Response demonstrates a minimal understanding of collecting and analyzing local and regional weather data to make inferences and predictions about weather patterns; explains factors influencing global weather patterns and climate; and describes the impact on Earth of fluctuations in weather and climate. Response is correct for one of the four possible answers. Response has one correct piece of information and contains several errors or omissions.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response.

Scoring Notes

a. Summer mean temperatures show an upward trend (an increase) in the past century.

b. The two glaciers are both decreasing in size.

c. The warmer temperatures and the melting glaciers could combine to cause:

- Increased precipitation: Under the right conditions, the water in the glaciers would be warmed and evaporated into the atmosphere, increasing the possibility of rain over the region.
- Drought: Increased temperatures and melting of the glaciers, in the absence of precipitation, could also cause drought. Water previously held in the glaciers and slowly released during warmer periods would now be released more quickly into the atmosphere, where it could be lost to this region.
- Flooding: Water that had been held as ice in the mountains could flow down the mountains into valleys in the region and cause flooding.
- Increased surface water: Less water in the glaciers could mean more surface water in lower regions (related to flooding).
- Groundwater: Depending on how much precipitation there is, groundwater supplies could either increase or decrease.
- Overall, students demonstrate an understanding of how weather is affected by the release of water previously held as ice in the glaciers.

Note: For part c, responses indicating an understanding of the relationship between changes in the glaciers and the water cycle are acceptable because these changes are factors that may affect weather.

Part a is worth 1 point, part b is worth 1 point, and part c is worth 2 points.

Score Point 4

a.) The temperature has steadily increased
b.) Glacier A slightly dropped followed by a more drastic drop and then decreased more slowly & steadily
Glacier B has had a slow gradual decline with now sharp or sudden changes
c.) One way it could affect the weathers is with the glaciers melting there would be more run off from the mountains, higher lake levels, water vapor could rise leading to increased precipitation. The second way it could affect the weather is through heat. If the trend continues the there will be even warmer summers, which could lead to more decrease in glacier size.

Score Point 3

The mean Summer temp. has gone up dramatically in the past hundred and ~~fifty~~ years.

The size of the glatiers has decreased dramatically in the past hundred and fifty years.

warmer and warmer Summers and more runoff due to glatial melt.

Score Point 2

A: The Sommer-mean temperatures have gotten higher in the Past century according to the graph. Shown in the graph as the years progress so does the temperature means.
B: In the last 150 years both Glaciers A and Glacier B have decreased in size because of the gradually warmer mean temperatures.
C. One way the trends in graph could affect Montana's weather is according to the graph Montana's weather will be and is getting gradually warmer. Trend 2 is that with the warmer temperatures is melting the glaciers and Montana could be getting the cold winds off the glaciers.

Score Point 1

a. The means have decreased.
b. Their size has decreased.
c. It could get colder and we could have a long winter

Score Point 0

a) in this graph it show that the summer temperature decreased

B) well the two glaciers have almost been the same size

C)

Science
Session 3

Write your answer in the space provided for it in your Student Response Booklet.

81. Forest fires are part of the natural cycle of coniferous forests in the Rocky Mountain range.

    a. Describe **two** ways natural populations can benefit from a forest fire.

    b. Explain **two** ways a forest fire can contribute to the evolution of a local population through natural selection.

Scoring Guide

Score	Description
4	Response demonstrates a thorough understanding of the interaction of biotic and abiotic factors that affects populations through natural selection and how this contributes to the evolution of species over time. Response describes two benefits of a forest fire to a natural population and two ways that forest fires can work through natural selection toward the evolution of the local population. Response contains no errors or omissions.
3	Response demonstrates a general understanding of the interaction of biotic and abiotic factors that affects populations through natural selection and how this contributes to the evolution of species over time. Response describes two benefits of a forest fire to a natural population and two ways that forest fires can work through natural selection toward the evolution of the local population. Response contains one error or omission.
2	Response demonstrates a limited understanding of the interaction of biotic and abiotic factors that affects populations through natural selection and how this contributes to the evolution of species over time. Response describes two benefits of a forest fire to a natural population and two ways that forest fires can work through natural selection toward the evolution of the local population. Response contains two errors or omissions.
1	Response demonstrates a minimal understanding of the interaction of biotic and abiotic factors that affects populations through natural selection and how this contributes to the evolution of species over time. Response describes two benefits of a forest fire to a natural population and two ways that forest fires can work through natural selection toward the evolution of the local population. Response has one correct piece of information and contains several errors or omissions.
0	Response is incorrect or contains some correct work that is irrelevant to the skill or concept being measured.
Blank	No response.

Scoring Notes

a. Natural populations may benefit from a forest fire in many ways:

- Removal of dead and decaying debris so that new growth can occur
- Removal of plants that might shade new growth
- Some plant seeds/cones need fire to germinate
- New seeds brought to new open ground by wind and birds can grow
- New areas now open to sunlight, which stimulates plant growth
- Both organic and inorganic material is recycled to the soil

b. The evolution of a local population through natural selection can happen in several ways:

- If an organism survives a forest fire, it is more likely to pass on this ability to survive fire to the next generation. Over time, this could develop a hardier species that is more likely to survive forest fires.
- Forest fires can change abiotic factors (how wet or dry a region is, sunlight availability, soil changes, etc.). Those individuals who survive these new conditions will be able to survive and reproduce, passing on these traits to the next generation.
- If a forest fire destroys a large part of the local population, survivors will pass on their traits to the next generation. This could result in the species gradually looking very different from the original population.
- A forest fire could also create a boundary within a population, separating one part of the population from the other. This would create, in effect, two new populations. In time, these two populations could evolve and become very different from one another.

Part a is worth 2 points and part b is worth 2 points.

Score Point 4

a) 1) The fire can burn away undergrowth other small trees, which reduces overcrowding and allows to other trees to grow and become more healthy.
2) Some trees seeds are released by fire so without the forest fire it becomes harder to reproce. The fire allows the seeds to spread.
b) 1.) The fire may only burn the drier types of wood or bark so tree that are more flame retardant and hold more moisture may live and reproduce.
2.) The fire may not reach up and burn trees with longer trunks and higher branches as easily. The trees with branches that don't hang low and start up high are able to live and reproduce.

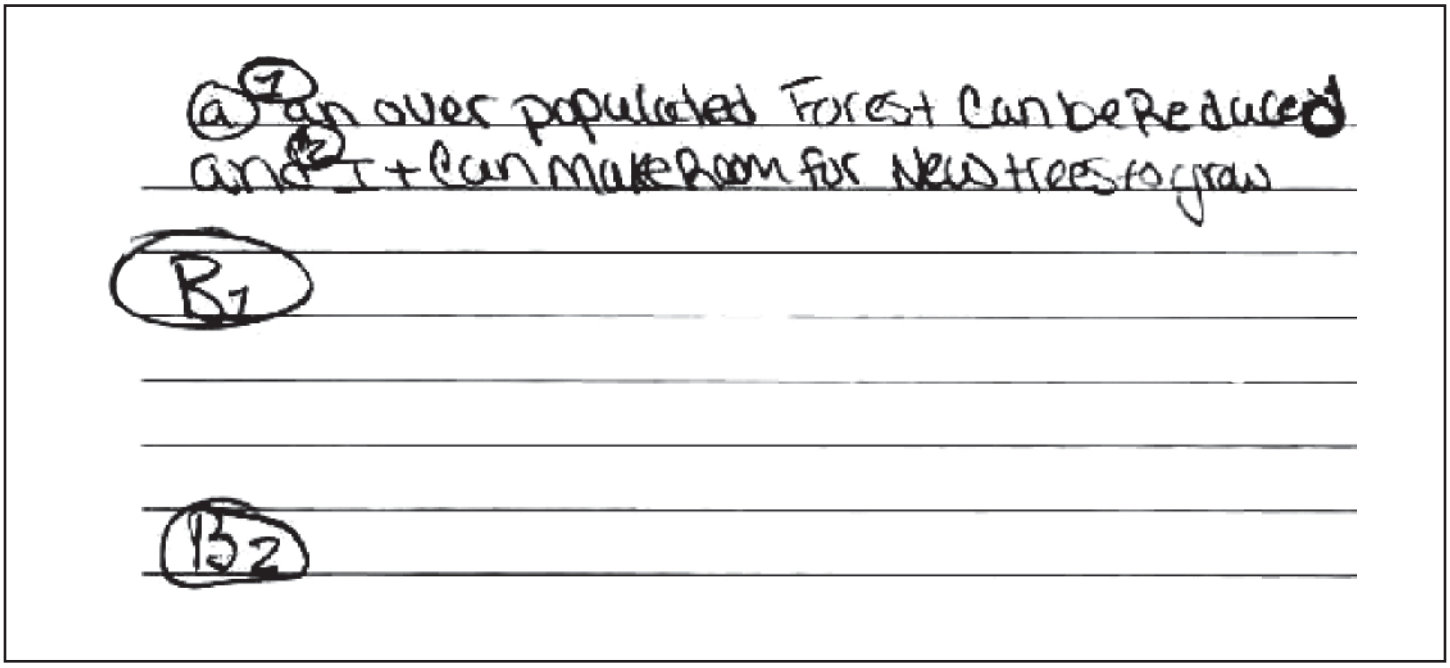
Score Point 3

A) ① old trees that could be invested w/ pine beetles will be wiped out leaving a new forest to be able to grow in healthy
② Fires can help diminish the overgrowth of the dominating species, leaving room for new plants to survive
B) ① As the fire kills the plants, the ones that survive will pass on the trait to help their offspring become somewhat resistant to fires.
② Over time the population will become somewhat resistent + then mutation might occur, creating a whole new species of vegitation. (starting the evolution process over w/ a new species)

Score Point 2

Two ways that natural population can benefit by forest fires is one with the fires after they are done can be good growing soil. Another way would be the dead trees could be taken out to not make the fires spread. By taking out the dead trees for more room so new trees can grow & having fertilized ground so new trees can get those nutrients.

Score Point 1



Score Point 0

A) do not Smoke out side, Be careful & what you are doing.

B) the grass can get on fire, the hey can also.